

REMARKS

The Office Action mailed February 1, 2010, has been received and its contents carefully noted. Claims 1-24 were pending. Claims 1-17 and 21-24 were rejected. Claims 18-20 were withdrawn from consideration. By this Response, claims 1-17 and 21-24 have been amended and claims 18-22 have been canceled. Support may be found in the specification and the claims as originally filed. In particular,

(1) Amended claim 1 corresponds to both the embodiment shown in FIGS. 5A to 5H, and the embodiment shown in FIGS. 7A to 7I. In amended claim 1, the first to fourth time points are times when the affects of the combined rinse liquid and inactive gas on the target substrate are changed in the dry process.

In the embodiment shown in FIGS. 5A to 5H, the first and fourth time points are shown in FIGS. 5E and 5G, respectively. The second time point is a time when the gas nozzle 16 comes to the center of the wafer W, between the states shown in FIGS. 5E and 5F. The third time point is a time when the wafer nozzle 17 comes to the edge of the wafer W, between the states shown in FIGS. 5F and 5G.

In the embodiment shown in FIGS. 7A to 7I, the first, second, and fourth time points are shown in FIGS. 7E, 7F, and 7H, respectively. The third time point is a time when the wafer nozzle 17 comes to the edge of the wafer W, between the states shown in FIGS. 7G and 7H.

The gas start position 10 to 50 mm distant from the center of the target substrate is supported by paragraph 0039 of the specification.

(2) Amended claim 10 has been amended to include all the claim elements of the amended claim 1.

(3) Amended claim 23 includes the same amendments as amended claim 1.

(4) Amended claim 24 includes the same amendments as amended claim 10.

(5) Amended claims 2-7, 9, 11-15, and 17 merely include amendments made in accordance with amendments to the independent claims. They also are made to improve readability and clarity.

(6) The amendments to claims 8 and 16 are supported by FIG. 7G and the corresponding description in the specification.

In view of the above, it is seen that no statutory new matter has been added. Therefore, reconsideration and entry of the claims, as amended, are respectfully requested.

Background and the Claimed Invention

As a conventional technique, for example, JP 2001-53051 mentioned in the specification, discloses a substrate dry method which feeds an inactive gas and purified water while moving the inactive gas spray point and the purified water feed point together radially outward from the center of a substrate. The present inventors discovered that such conventional techniques are likely to generate water marks in the central portion of the target substrate. The present substrate cleaning method suppresses water mark generation.

To this end the independent claims, as amended, include the following two unique claim elements:

(1) Feeding of an inactive gas onto the surface of the target substrate is started at or before the recited first time point, at which liquid feed and gas feed point begin to be scanned. The gas feed point is set at a gas start position 10 to 50 mm distant from the center of the target substrate.

(2) Feeding of the inactive gas is performed while moving the gas feed point radially inward from the gas start position to the center (during the period from the first time point to the second time point).

When scanning of the liquid feed point from the center of the target substrate toward the periphery is started, the liquid film gradually disappears, due to the centrifugal force, from the center of the target substrate where the rinse liquid is no longer fed. This begins drying of the target substrate. As the centrifugal force applied to the liquid film is weak at the central portion of the target substrate, the dry speed is slow at this portion. According to the present invention, the inactive gas is fed near the center of the target substrate, and the central portion of the target substrate which starts to be dried first, is not likely to be exposed to air. This suppresses generation of water marks originating from oxidation of the surface of the target substrate.

Objection to the Claims

The Examiner objected to claims 22 and 24 because the Examiner deemed that the claims

are duplicative.

Applicants respectfully submit that the objection to the claims may be withdrawn in view of the cancellation of claim 22.

Rejections under 35 U.S.C. 112, second paragraph

The Examiner rejected the claims under 35 U.S.C. 112, second paragraph, as allegedly indefinite. Specifically, the Examiner deemed that the phrases: “adequate distance” and “a vicinity of the center” in claims 1, 2, and 23; “while moving a rinse-liquid feed point for supply of the rinse liquid to the target substrate” in claim 1; “near the circumferential portion of the target substrate” in claims 7 and 15; and “feed point” of claim 10 is unclear and indefinite. The Examiner deemed that “the rinse-liquid feed point” lacks positive antecedent basis. The Examiner rejected claims 3 and 11 as being indefinite because it is allegedly unclear if the circumferential and periphery portions are the same as recited in claim 1. The Examiner rejected claims 8 and 16 as being indefinite because it is allegedly unclear as to what Applicants are claiming.

Applicants respectfully urge that the claims, as amended, are clear and definite, and that the rejections under 35 U.S.C. 112, second paragraph, should be withdrawn.

Rejection under 35 U.S.C. 102(b)

The Examiner rejected claims 1-2 and 5-8 under 35 U.S.C. 102(b) as being anticipated by Shunichi (JP 2002-057088).

Applicants respectfully submit that Shunichi does not teach the instant invention as claimed. It should be noted that the assignee of the instant application and the assignee of Shunichi are the same.

Applicants respectfully submit that Shunichi discloses a substrate drying method which feeds N₂ gas and purified water while moving the N₂ blow point 62 and purified water feed point 63 together radially outward from the center of a substrate, as described in paragraph 0047, for example. However, as described in this paragraph, this method starts, N₂ gas blowing immediately after starting scanning of the purified water feed point 63, and, specifically, when the N₂ blow point 62 comes to the center of the substrate.

Shunichi teaches feeding purified wafer (rinse liquid) in front of N₂ gas blow, so as to assist conventional techniques with the following problem. Specifically, as described in paragraphs 0004 and 0048, for example, where no rinse liquid is fed at a position between an N₂ gas blow point and the substrate edge in a dry process after a rinse process, the flow directions of the rinse liquid caused by the gas blow and the dry direction become substantially opposite, thereby bringing about liquid residues. Accordingly, Shunichi does not blow gas onto the substrate, outside the feed of a rinse liquid, which, as Applicants require in their claims, takes place in the first time point, or in the beginning of the period from the first time point to the second time point.

For at least these reasons, Applicants respectfully urge that the claims, as amended, are novel and the rejection under 35 U.S.C. 102(b) should be withdrawn.

Rejections under 35 U.S.C. 103(a)

The Examiner rejected claim 3 under 35 U.S.C. 103(a) as being unpatentable over Shunichi, as evidenced by Nagakawa (US 20030022515). The Examiner also rejected claims 4, 9-10, 12-17 and 23-24 as being unpatentable over Shunichi in view of Yamasaka (US 5,997,653). Lastly, the Examiner rejected claim 11 as being unpatentable over Shunichi in view of Yamasaka and further evidenced by Nagakawa.

Applicants respectfully submit that Nagakawa and Yamasaka, alone or in combination, do not alleviate the deficiencies of Shunichi.

Nakagawa discloses a technique which feeds a gas from the central side of a substrate to the periphery thereof while setting the gas blow angle at 20-600. Yamasaka discloses a technique which uses a higher rotational speed of a substrate in a dry process. However, neither Nagakawa nor Yamasaka discloses anything about blowing a gas onto a substrate outside of the feed of a rinse liquid, which Applicants place in their first time point, or in the beginning of the period from their first time point to their second time point neither teaches or suggest the advantage deriving therefrom.

For at least these reasons, the cited documents, alone or in combination, do not result in the claimed invention as a whole.

Thus, Applicants respectfully submit that the claims, as amended, are unobvious and the

rejections under 35 U.S.C. 103(a) should be withdrawn.

Request for Interview

A telephonic or an in-person interview is respectfully requested should there be any remaining issues.

CONCLUSION

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Therefore, it is respectfully requested that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Official action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

It is not believed that extensions of time are required, beyond those that may otherwise be provided for in accompanying documents. However, in the event that additional extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. 1.136(a), and any fees required therefor are hereby authorized to be charged to **Deposit Account No. 02-4300, Attorney Docket No. 033082M354.**

Respectfully submitted,
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